

25

UNDERSEA WARFARE COMBAT SYSTEMS

USW
Combat Systems

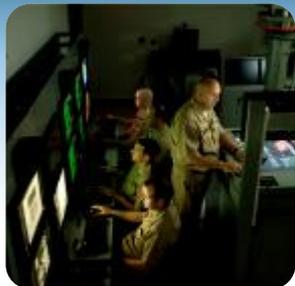
Code 25 Industry Day Brief

27 October 2020



DISTRIBUTION STATEMENT A. Approved for public release.

USW Combat Systems Department



OUR MISSION:

We will exceed customer expectations by providing high quality, affordable products and services while helping to shape the next generation of USW systems.

Our workforce is focused on innovation, agility and collaboration to provide effective, best value solutions for our customers.

OUR VISION:

Ensure Warfighter Command of the Undersea Battlespace.

OUR PRINCIPAL ROLES:

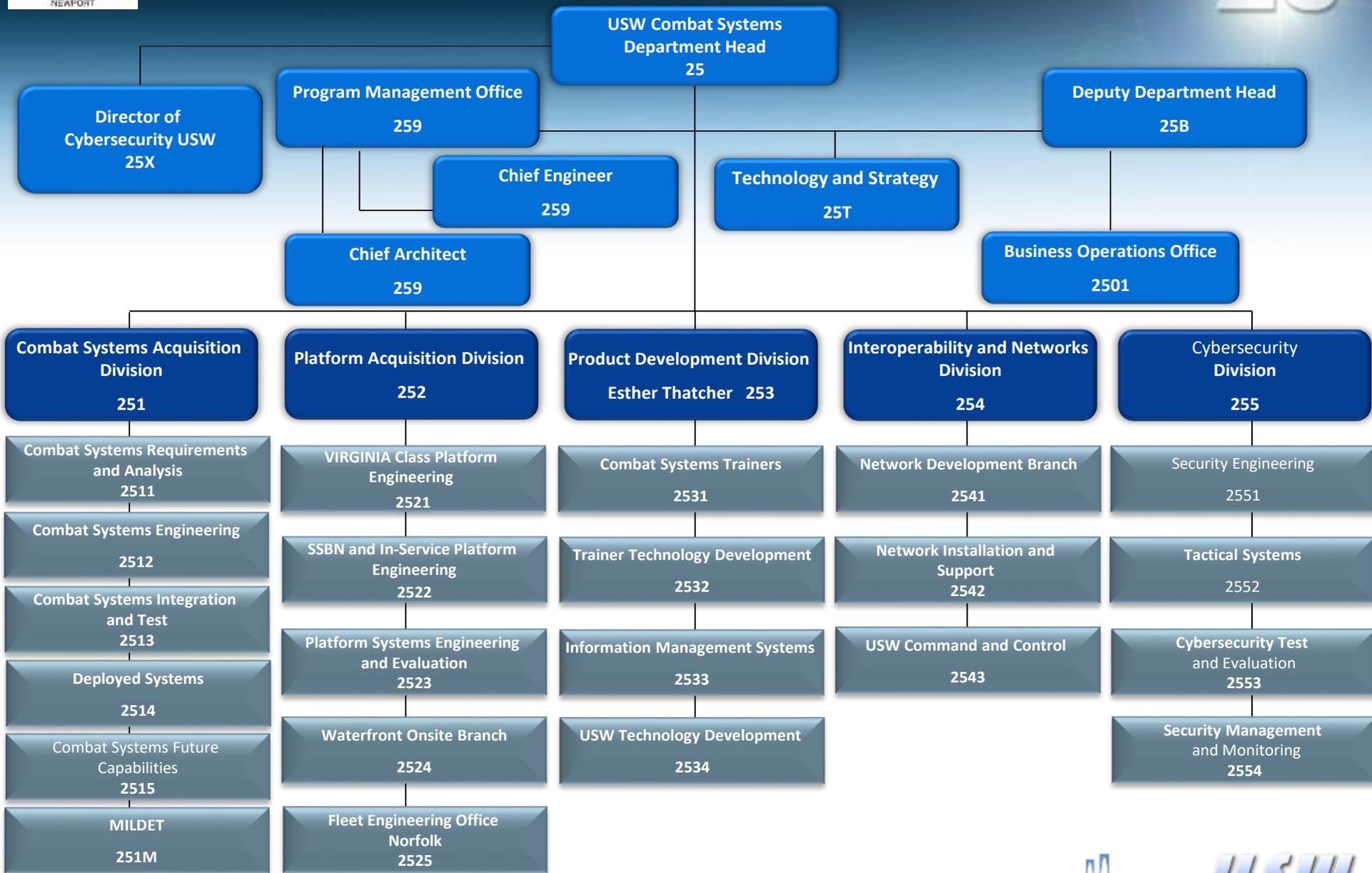
- *Technical Direction Agent*
- *In-Service Engineering Agent*
- *Design Agent*
- *Central Design Authority*

Stewardship of USW Combat Systems Technical Health



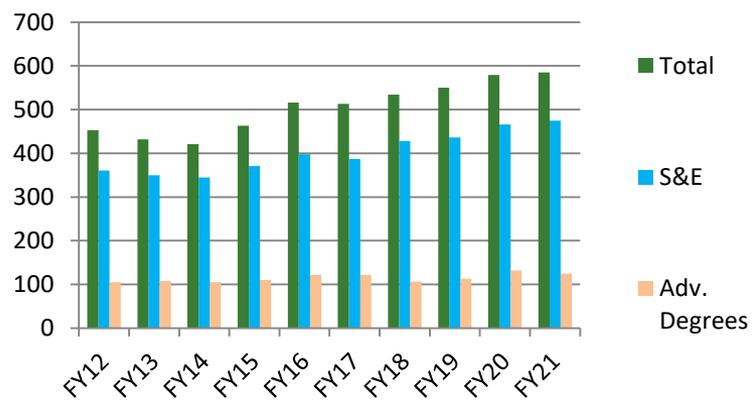
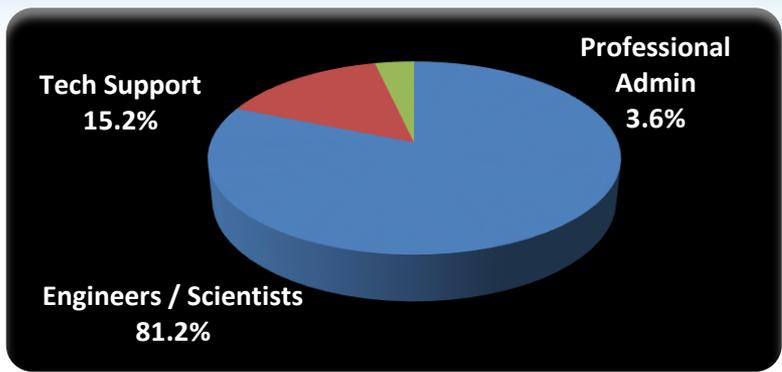
USW Combat Systems Department

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Our People

Our Highly Skilled Workforce is Among the Most Qualified in the Field (8 PhDs and 117 Masters)



Staffing: 585 Government and 436 Contractor as of 30 September 2020

USW Combat Systems Programs

Bridge to the Fleet



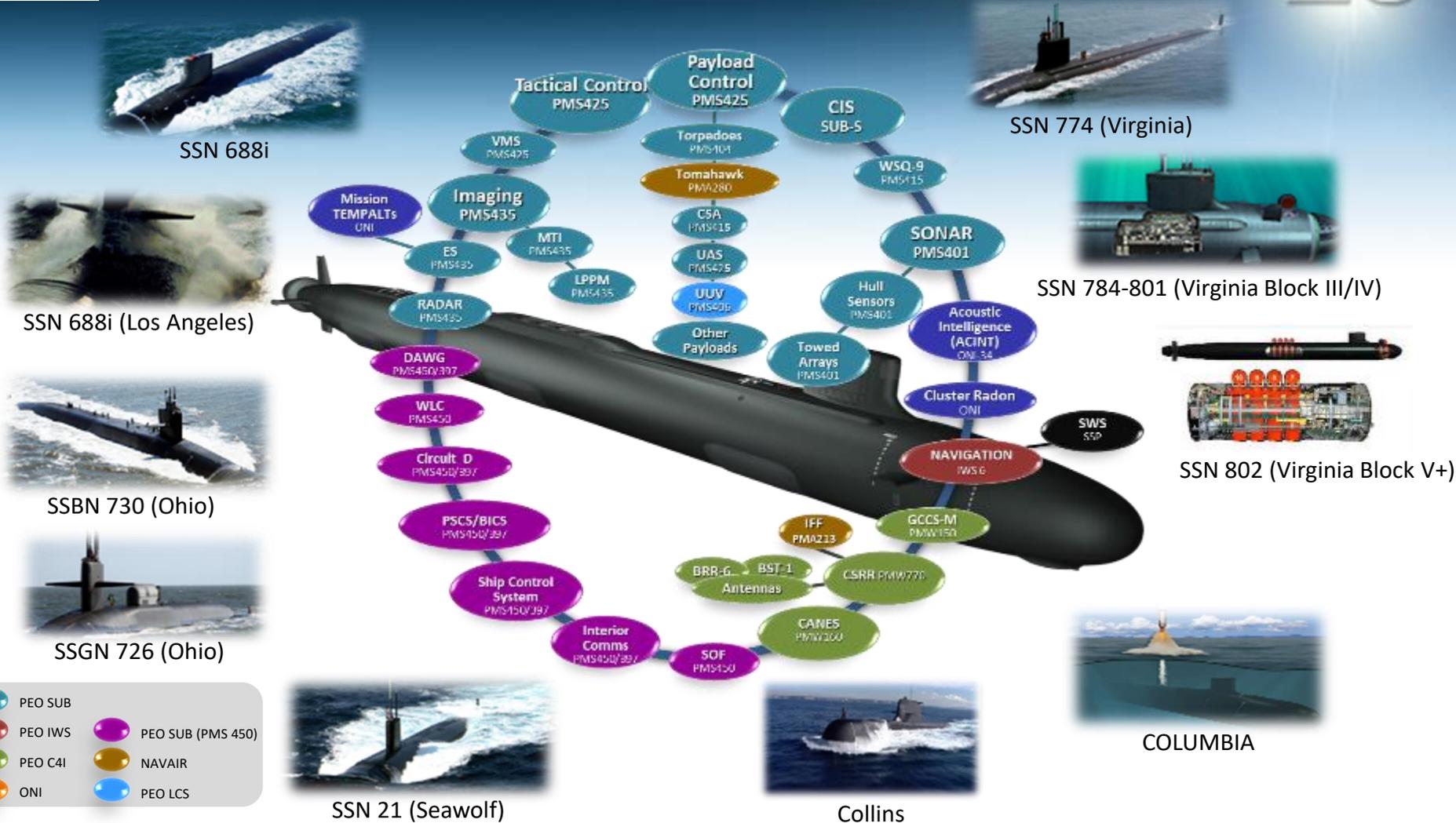
- Naval Tactical Cloud
- Unmanned Undersea/Air Vehicle (UxV) Common Control
- Unmanned Systems (UxS) Experimentation
- Human Factors Engineering
- Virtual Worlds
- Combat Systems Hardware/Software/Network Architectures

- Virginia Block VI/VII/SSN(X)
- Combat Systems Virtualization
- Submarine Warfare Federated Tactical System (SWFTS) Seamless Rearchitecture
- Live/Virtual/Constructive (LVC)
- Unmanned Systems (UxS) Experimentation
- Unmanned Aerial Systems
- Payload Prototyping
- AN/BYG-1 Virtual Twin
- Cyber Security Systems Engineering

- AN/BYG-1
- Tactical Tomahawk Weapons Control System (TTWCS)
- Virginia
- Columbia
- Trainers (Submarine Multi Mission Team Trainer (SMMTT), Submarine Bridge Trainer (SBT))
- SWFTS
- Submarine Local Area Network (SubLAN)
- Submarine Consolidated Afloat Network and Enterprise Services (CANES)
- USW Strike
- International Programs
- Cybersecurity

- Submarine Combat Systems In-Service Engineering Agent (ISEA)
- Ohio/Seawolf ISEA
- Tomahawk Logistics and Fleet Support
- SSGN Attack Weapon Control System
- Operational Documentation
- Trainer On Site Agents
- Global Command & Control System-Maritime (GCCS-M)
- Navy Training Management Planning System (NTMPS)
- SEAWARE-Learning Management System (LMS)/Submarine On-Board Trainer (SOBT)
- Nosis
- Cyber Accreditation

Diverse Set of Customers Across SYSCOMs, ONR and the Fleet



Executing Technical Authority Across Programs, Platforms, and System of Systems



Division Newport Offices and Laboratories

- **Key Facts:**
 - Located in Newport, RI on the Naval Undersea Warfare Center Division Newport campus
 - Office Space: 3 buildings, approximately 90,000+ square feet accommodating over 500 government, contractors and military personnel.
 - Laboratories: 3 separate labs totaling 90,000+ square feet supporting prototyping, development, in-service and fleet support and integrated logistics
 - Internal connectivity to other USW warfare systems via campus-wide fiber link
 - External connectivity to fleet, other government and Navy labs as well as industry

Our Fleet Presence Deployed Systems

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- **Submarine Combat Support Center (SC²)**
 - Tracking and responding to all SUBS and CASREPs
 - Analyzing Fleet feedback mechanisms
 - Communicating with TYCOM, Squadrons, RMCs
 - Providing 24/7 Fleet Chat Support for USN Submarines
 - Currently adding FMS Support for United Kingdom (Tomahawk)
 - Developing and Distributing OD 44979 procedures for the Fleet
 - Supporting Tactical Strike missions



Combat System, Strike, Launcher, and Simulator Support



Immediate Response to the Fleet to Provide Guidance and to Prevent Underway Limiting Issues

- **COMSUBPAC On-Site Support**

- Providing direct support to COMSUBPAC, located in Pearl Harbor
- Conducting AN/BYG-1 Hardware and Software Installations
- Providing TEMPALT and Logistics Support
- Responding to fleet issues via technical assists
- Keeping the fleet informed of future capabilities
- Conducting crew training as required



- **UWDC TAG**

- Combat Systems and Strike Warfare (SYSDEV)



Ensuring Operational Readiness 24/7/365



Our Fleet Presence

Kings Bay OSO and Bangor Detachments

- Two locations with similar Fleet Support missions
- Waterfront engineering and trainers support for SSBN, SSGN and SSN NPES; Technical On-Site Agent (TOSA) for USW Trainers
- Provides technical fleet support to SSBNs and SSGNs for PMS 392 responsible systems. Tasking includes interaction with the fleet in support of the planning, installation, maintenance, modernization, and testing of the OHIO class tactical CCS/NPES systems and SEAWOLF Class NPES
- Fleet Operational Support
- Modernization and Alteration Management Support
- Ensure that CCS/NPES technical support and links to system engineering is readily available to minimize tactical system's impact on a submarine's capability to meet its schedule and conduct its strategic mission



COMSUBGRU NINE
Bangor, WA



COMSUBGRU TEN
Kings Bay, GA

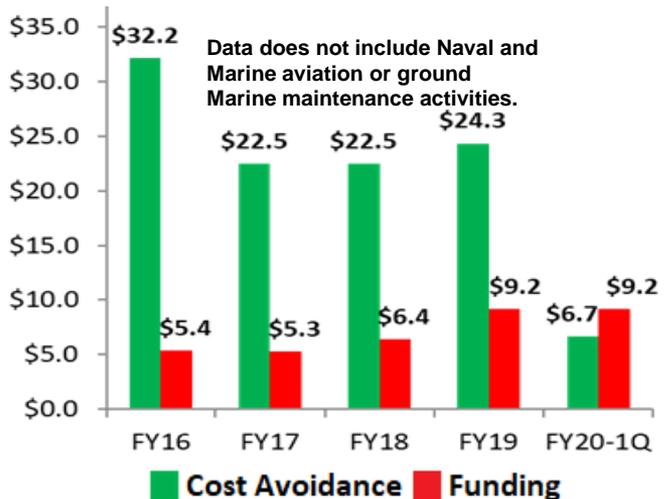
~ **Waterfront Team** is an Integral part of our Fleet Readiness Efforts and Possesses a **Unique Skill Set** ~

Our Fleet Presence

Field Engineering Office Norfolk



- Tenant organization of Norfolk Naval Shipyard at Saint Juliens Creek Annex in Portsmouth, VA
- NAVSEA Module Test and Repair (MTR) Program
 - Paired with NAVSEA’s Miniature Microminiature (2M) Program
 - Together they define the DOD’s standardized methods to test and repair electronics
 - ISEA for MTR Program equipment, software, and training



Supports

- U.S. Navy
- U.S. Marine Corps
- U.S. Coast Guard
- Foreign Military Sales (FMS)



- From 1996 to 2019, Maritime Navy reported 227,440 2M/MTR repairs completed, with 13,772 CASREPS corrected and \$819.25M in OPTAR cost avoidance

| | FY16 | FY17 | FY18 | FY19 | FY20Q1 |
|-------------------|-------|-------|-------|-------|--------|
| Repairs Completed | 7,790 | 7,493 | 8,174 | 7,516 | 1,856 |
| CASREP Related | 459 | 212 | 340 | 261 | 39 |

2M/MTR ensures the Warfighter has the means to continue to stay in the fight by making repairs on site. Putting the right capabilities in the right hands at the right time.

Our Onsite Program Reps



Washington, DC

- PMS 392
- PMS 397E NPES (2)
- PMS 450X Virginia Payloads/TSEP (2)
- PMS 450F Lifecycle Support
- PMS 425 AN/BYG-1, SECDEVOPS (2)
- Strategic Systems Programs
- OPNAV N97 Payloads
- SCO (Fall 2020)

*Also, San Diego, CA –
PMW160 – Submarine
CANES*

- Support over 20 projects across various portions of their respective product lifecycles
- Complement the expertise of our workforce resulting in a powerful technical resource that enables USW Combat System land-based prototyping, experimentation, development, integration and test, training, assessment and certification
- Combined with other Division Newport facilities and campus-wide connectivity, our labs provide the core component of the Virtual Submarine
- External linkages to industry via our Wide Area Integration Facility (WAIF) facilitate partnerships with these entities in promoting efficient development and integration of new capabilities

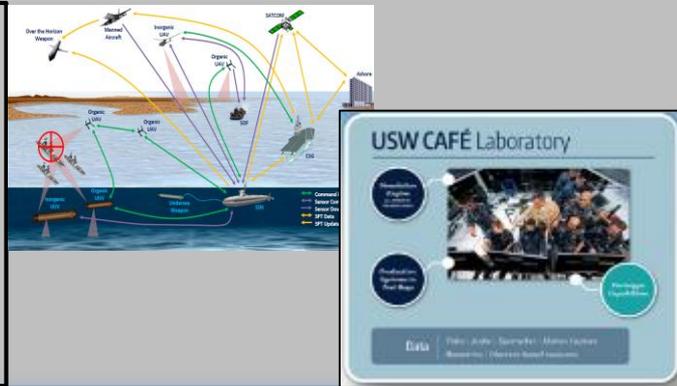


Major Programs

| Program | Sponsor |
|---|---|
| USW Combat Systems Trainers | NAVSEA SEA07TR |
| AN/BYG-1 Combat Control System | PEO SUB PMS425 |
| Virginia/COLUMBIA Class Submarine | PEO SUB PMS450/PMS397 |
| <ul style="list-style-type: none"> Platform Engineering | |
| <ul style="list-style-type: none"> Test & Evaluation (T&E) | |
| <ul style="list-style-type: none"> Combat Systems | |
| Tomahawk Weapon Control System (TWCS) | PEO (U&W) PMA-280 |
| Ohio Non-Propulsion Electronic System (NPES) Engineering | NAVSEA PMS392 |
| Submarine Warfare Federated Tactical System (SWFTS) | PEO SUB-S |
| Submarine Networks | PEO C4I PMW160 |
| Cyber Security | PEO SUB (PMS 425/397/450), SSP, SEA 05, Fleet, PHD NSWC |
| Strategic Systems Programs | SSP 2012, 23, 208, 24, 27, C |

Unmanned Systems

- Submarine Launched Unmanned Aerial Systems (SLUAS) integration and advanced development
- Combat Systems prototyping to enable integration of Unmanned Undersea Vehicles (UUVs) on Submarines
- Implementing the vision for UxS C2 via experimentation (ANTX) and advanced development (ONR)

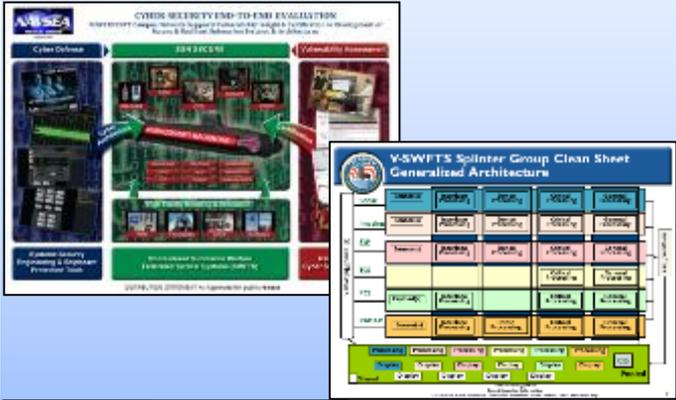


Payload Integration

- Advanced prototyping and Concept of Operations (CONOPs) for platforms (VA, VPM, CLB, and SSGN)
- Emerging payloads requirements definition, interface development documents and risk reduction activities
- Supporting Program of Record (Tomahawk, ADCAP, CPS) and future payload evolution plans

Cybersecurity

- USW Enterprise Policy Development
- VA/CLB Cyber DT
- Fleet Exercise Technical Lead
- SWFTS and BYG-1 Cybersecurity Engineering
- SSP Cybersecurity Policy and A&A
- SSN(X) Cyber Capability Vector Lead
- SYSCOM/PEO Program Support (Development, Accreditation)
- Development of Cyber Security Workforce



Architecture

- Defining the next generation of systems architecture
- Leveraging state of the practice technology across SWFTS, USW Trainer and Network systems
- Technical leadership for SWFTS Seamless Rearchitecture and vTwin OTA
- Technical Direction Agent for SWFTS Common Infrastructure and AN/BYG-1 Payload Control Systems
- Development of UK Tomahawk Architecture leveraging AN/BYG-1 Strike implementation

Platform Engineering

- Ohio SWFTS Modernization
- Columbia Class Block I/II, Virginia Class (VCS) Block V/VI and SSN(X)
- VCS/Columbia (CLB) Non-Propulsion Electronics System (NPES) team consolidation
- SSGN Attack Weapon Control System Upgrade



Virtual Environment

- Expanding on sim/stim capabilities for POR systems such as Submarine Bridge Trainer (SBT)
- Enhancing NUWC Virtual Sub constructs in support of new payload initiatives
- Building enterprise-level Live, Virtual, Constructive (LVC) capability

Enablers for Future USW Combat Systems

Model Based Systems Engineering

- Enabling the digital transformation of USW Combat Systems to provide Fleet focused products and services for today's fast paced engineering environment.

MBSE has roles in:

- Traditional Systems Engineering
- DevSecOps and C2C24 vision

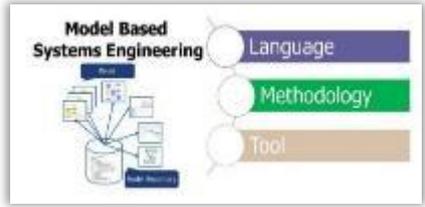
Multiple Programs Implementing

Outreach and Collaboration

- Community of Interest (COI)
- Community of Practice (COP)
 - 10 focused sessions to date
- Internal Investments

Training

- ~45 people trained on basic SysML

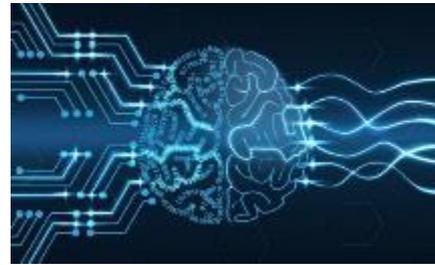


Artificial Intelligence/Machine Learning

- Exploring techniques as a new way to reduce operator burden and utilize the vast amount of data generated by our systems to gain greater insight and solve complex problems at machine speed.

We are actively pursuing work in:

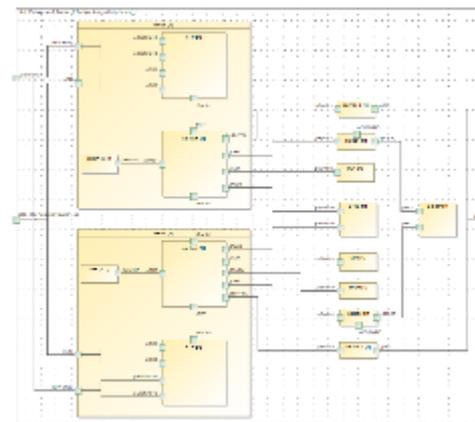
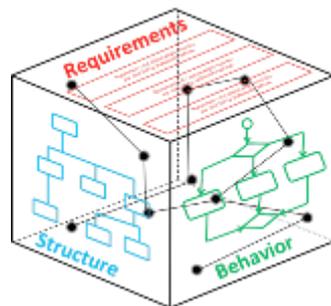
- Developing Cybersecurity tools that detect and adapt to attacks as they occur
- Using Neural Networks for image and acoustic classification
- Generating and evaluating tactics and maneuvers using algorithms and simulation
- Researching new methods of developing autonomous behaviors
- Developing architecture solutions for extremely large data sets



Near term

Far term

- Continue training → Language, tool, methodologies.
- Facilitate COI and COP
 - Identify MBSE solutions to challenges and knock down barriers to adoption
 - Bottoms-up effort at project level
 - Share challenges, approaches, solutions
- Establish linkages and efficiencies with cross-SYSCOM activities
 - Curate reference models, libraries and methodologies for applications to Combat Systems SE challenges
- Execute Digital Transformation
 - Refine and apply synchronization of MBSE to Agile development processes, SecDevOps and C2C24 concepts
 - Models linked to digital repositories, reference “up” to mission-level models, reference “down” to component-level models and external analytical tools, reference laterally to other cross-Department/cross-Domain system models



Enablers for Future USW Combat Systems

Advanced Concept Prototyping

Advancing Future Concepts through Rapid SW and HW Prototyping

- Rapid design, development and integration of future payloads with USW combat systems is critical for producing fleet focused products in today's fast paced engineering environment

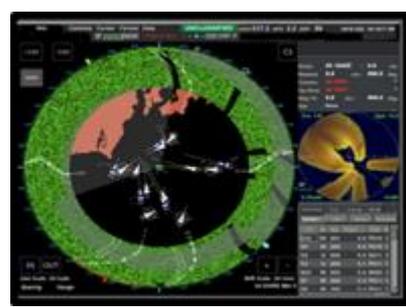
Undersea and Strike weapons:

- Prototyping user displays, Front and back end processing, integration with future Combat System architectures
- Sponsors include PMS 425, PMS 404, SCO, SSP and others

Unmanned Systems:

- Prototyping vehicle specific modules, integration with future Combat System architectures, user displays for C2 and Mission Planning
- Sponsors include DASN, ONR, PMS 425, and others

Goal is to leverage existing and future SWFTS, AN/BYG-1 and NUWC Virtual Submarine architectures to support SW/HW development, integration, and demonstration of new concepts



USW Combat Systems

Aligning our Technical Vision and Strategy

Technology Product Vision 2020

NPT Core Mission Area: Undersea Warfare Combat Systems

Potential Game Changers/ Disruptive Technologies

- Quantum Computing, Communications & Cryptography
- Brain-machine interface
- Autonomous systems
- Neurostatistical memory
- Artificial Intelligence/Machine Learning/Data Analytics
- Digital Twin/Physical Twin
- Resilient/Reconfigurable/Adaptive
- AI/ML/Big Data
- Cybersecurity/Resilience
- Augmented/AR/VR
- Zero Trust Networks
- UE/OPN/Composites
- Block Chain

flexible, agile and ready forces

all domain access

deterrence

sea control

power projection

marine security

capabilities

concepts

Ref: A Cooperative Strategy for 21 Century Sea Power

Current Focus
Deliver cyber secure Combat System improvements that meet the Navy's Columbia Class (Strategic Deterrence Mission) and Virginia Payload Module and Unmanned Systems Control objectives (Theater USW Mission)

Next Navy (+5-10 yrs)

Navy After Next (+20 yrs)
An adaptable, reduced footprint, CYBERSAFE Combat System which supports the CO and Crew in mission planning and execution through data driven decision making using advanced reasoning, modeling, visualization and seamless payload and C2 interfaces..

| Technical Thrusts | Integrated Force Focus | Theater USW Focus | Optimized Mission Focus |
|--|--|---|---|
| Architecture Delivery Model S/W Architecture H/W Architecture | RCT Modernization (TU/APB/ACB) Federated Subsystems (SWFTS) Dedicated Computing Components | Architecture Hybrid-Service Architecture Common Computing Cluster | Continuous Delivery PaaS/Data Lakes Infrastructure as a Service (IaaS) |
| Functionality Situational Awareness Environment Payload Control Mission Planning | Manual Organic Correlation Empirical Reach back/Organic Sense Operator-managed Payload Control Stovepipe Mission Planning | Functionality Automated Theater-level Fusion Services Smart Payloads Platform/Theater Mission Control | Joint/Coalition Fusion Environmental Agents Autonomous Payloads Joint/Coalition Mission Ctrl |
| Comms and Cyber Security Cyber Security Ad-hoc Networks Wide Area Networks | Comms and Cyber Security Traditional Off Board Comms (HF/SAT) | Comms and Cyber Security Hybrid-Service Architecture Anti-Access Resilient Comms | Comms and Cyber Security Wireless Mesh Network/Quantum |
| Readiness Availability Usability Training | Readiness Scheduled Maintenance Functional Design Family of Tailored Trainers | Readiness Adaptive Redundancy User-adaptive Design Adaptive In-stride Training | Readiness Adaptive Redundancy User-adaptive Design Adaptive In-stride Training |

AI/ML/Big Data

UTIC SWFTS
Seamless Rearchitecture

UTIC vTwin

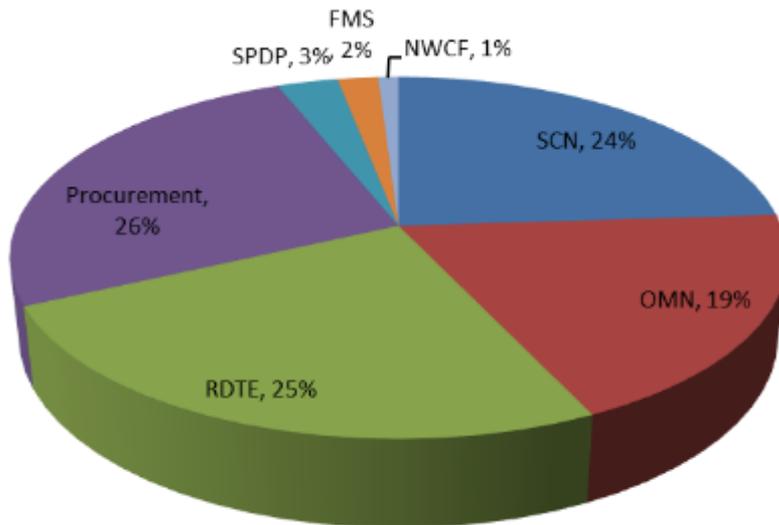
MBSE

Rotational Assignments

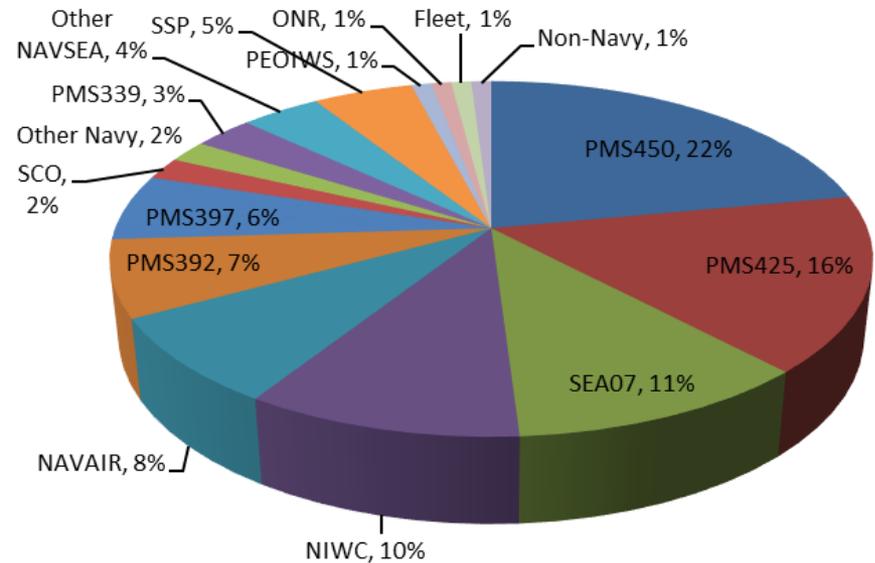
LVC M&S
SecDevOps

Assimilating future requirements, technology, process improvements to achieve *Compile to Combat in 24 hours (C2C24)*

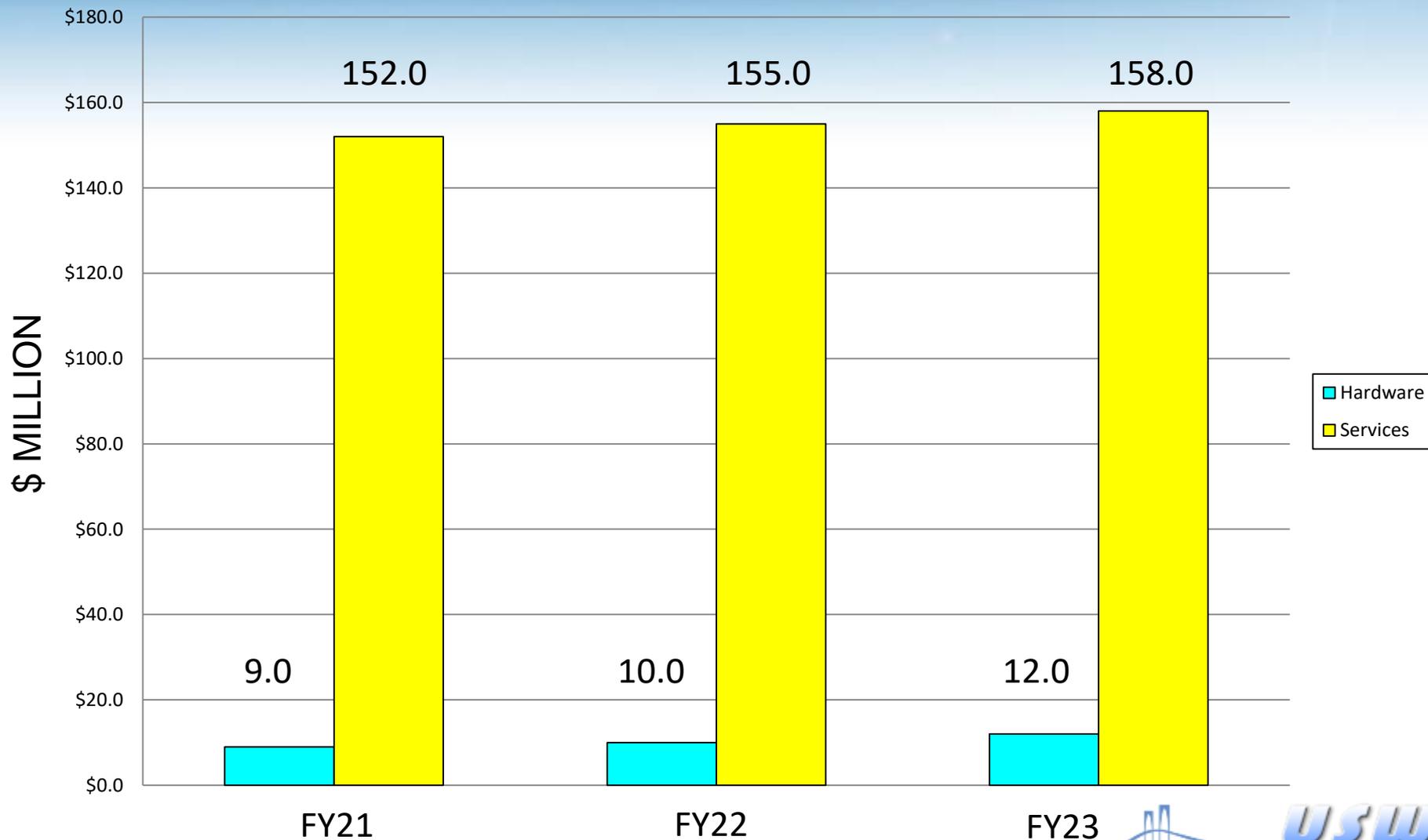
FUNDING BY APPROPRIATION



FUNDING BY Sponsor

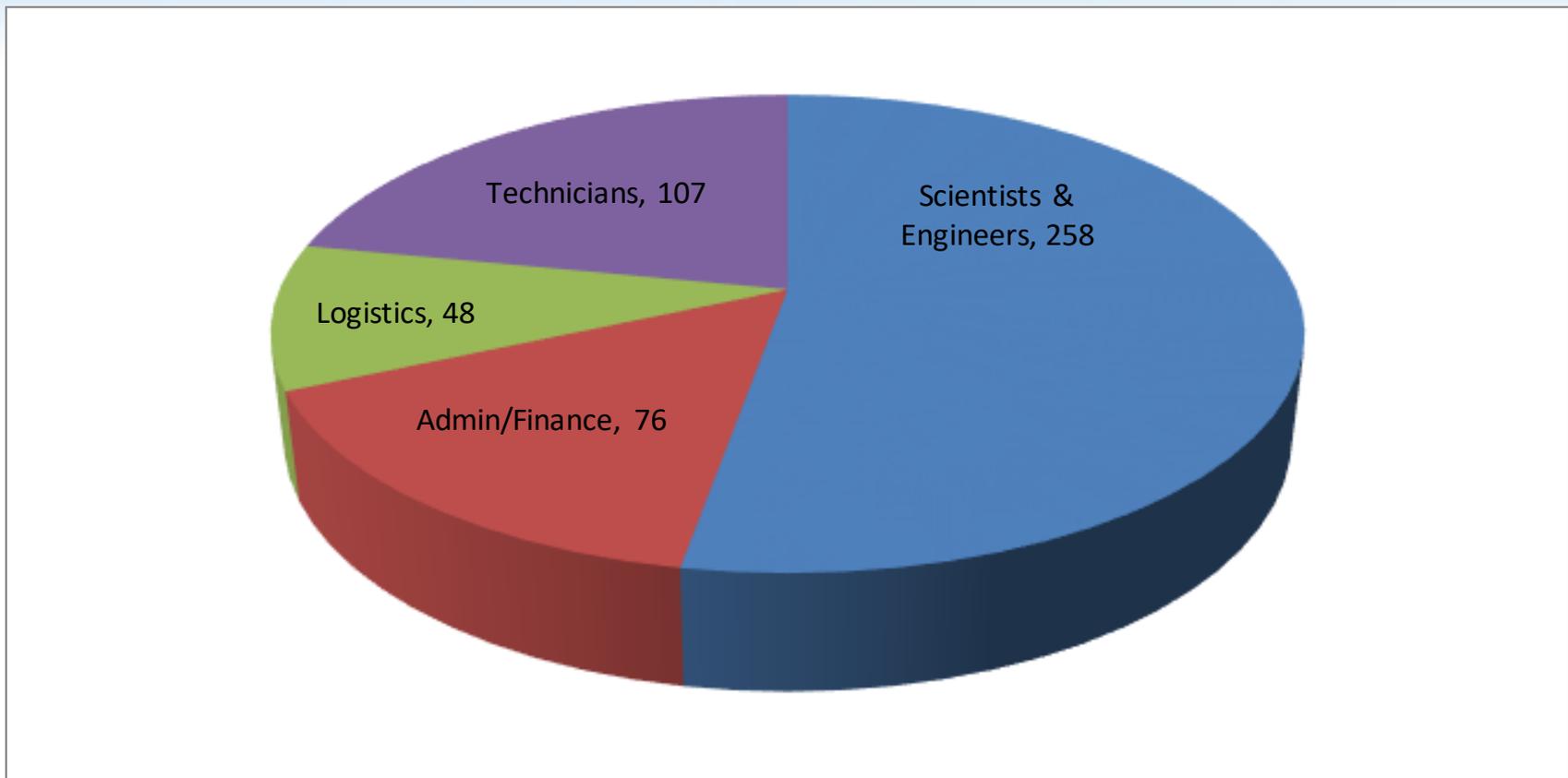


Projected Contract \$



Contractor Personnel Profile

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Projected Code 25 Contracts

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| Task Description | Estimated Value (\$M) | Anticipated Strategy | Action Type | Current Contract # | Incumbent | Anticipated RFP Release FY QTR |
|---|-----------------------|----------------------|-------------|-------------------------------------|--|--------------------------------|
| Code 25 Lab Support | \$17.3 | SBSA | Seaport | N00178-14-D-7834/N403 | MIKEL INC. | 2021 QTR 1 |
| Data Acquisition and Retrieval System (DARTS) Support | \$40.0 | Sole Source | IDIQ | N66604-15-D-0130 | PROGENY SYSTEMS CORPORATION | 2021 QTR 1 |
| Submarine Local Area Network (SubLAN) / Consolidated Afloat Network and Enterprise Services (CANES) Development | \$24.9 | Unrestricted | Seaport | N00178-14-D-7578 / N66604-18-F-3005 | LEIDOS, Inc. | 2021 QTR 1 |
| Norfolk Modular Test and Repair (MTR) Support | \$13.2 | TBD | Seaport | N00178-04-D-4045/N402 | Engineering Services Network (ESN) | 2021 QTR 2 |
| Submarine On-Board Trainer (SOBT) Sustainment | \$22.8 | TBD | Seaport | N66604-14-D-231A/B/C | Sonalysts Inc., AMSEC, Delex Systems Inc., URS | 2021 QTR 3 |
| SUBLAN / CANES Services | \$11.0 | TBD | Seaport | N00178-14-D-7721/N401 | G2 Software Systems | 2021 QTR 3 |
| Platform Cybersecurity | \$50.0 | TBD | Seaport | N/A | N/A | 2021 QTR 3 |
| Combat Control Systems | \$45.0 | TBD | Seaport | N00178-04-D-4115/N66604-18-F-3014 | RITE SOLUTIONS | 2021 QTR 4 |

Projected Code 25 Contracts (continued)

| Task Description | Estimated Value (\$M) | Anticipated Strategy | Action Type | Current Contract # | Incumbent | Anticipated RFP Release FY QTR |
|---|-----------------------|----------------------|-------------|---------------------------------------|--|--------------------------------|
| Trainer Hardware Fabrication | \$10.0 | TBD | IDIQ | N66604-17-D-D701/2/3 | BAE Systems, GDMS, MES Simulation and Training Corp. | 2022 QTR 1 |
| Global Command & Control System-Maritime (GCCS-M) Support | \$10.0 | TBD | Seaport | N00178-14-D-7834/ N66604-17-F-3006 | MIKEL INC. | 2022 QTR 1 |
| Submarine Multi Mission Team Trainer (SMMTT) / Trainer Operations | \$30.0 | TBD | Seaport | N00178-04-D-4091/ N66604-18-F-3004 | NORTHROP GRUMMAN SPACE & MISSION SYSTEMS CORP. | 2022 QTR 2 |
| Trident On-Site Support | \$10.0 | TBD | Seaport | N00178-16-D-8623/ N66604-18-F-3008 | Cameo Professional Support Services LLC Space and Mission Systems Corp. | 2022 QTR 4 |

Projected Code 25 Contracts (continued)

| Task Description | Estimated Value (\$M) | Anticipated Strategy | Action Type | Current Contract # | Incumbent | Anticipated RFP Release FY QTR |
|---|-----------------------|----------------------|-------------|-----------------------------------|--|--------------------------------|
| Risk Management Framework (RMF) Cybersecurity | \$20.0 | TBD | Seaport | N00178-14-D-7795/N66604-18-F-3020 | KMS SOLUTIONS, LLC SPACE & MISSION SYSTEMS CORP. | 2023 QTR 1 |
| Norfolk Material Contract | \$12.0 | Sole Source | IDIQ | N66604-18-D-H800 | HUNTRON SPACE & MISSION SYSTEMS CORP. | 2023 QTR 1 |
| Trainer Verification and Validation (V&V) Support | \$15.0 | TBD | Seaport | N00178-04-D-4122/N66604-19-F-3004 | SYSTEMS ENGINEERING ASSOCIATES CORPORATION, DBA SEA CORP | 2023 QTR 3 |

QUESTIONS?

- Contact NUWC's Small Business Advocate
– NUWC_NPT_OSBP@navy.mil